

# NUCLEAR MONITOR

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## Editorial

Dear readers of the WISE/NIRS Nuclear Monitor,

In this issue of the Monitor:

- We have a detailed chronology of the many problems at the Fukushima nuclear plant over the past 12 months.
- Robert Jacobs, an associate professor at the Hiroshima Peace Institute of Hiroshima City University, writes about the social, psychological and political dimensions of radiation exposure. "Radiation makes people invisible," Jacobs writes. "It makes them second class citizens who no longer have the expectation of being treated with dignity by their government, by those overseeing nuclear facilities near to them, by the military and nuclear industry engaged in practices that expose people to radiation, and often by their new neighbors when they become refugees."

Feel free to contact us if you have feedback on this issue of the Monitor, or if there are topics you would like to see covered in future issues.

Regards from the editorial team.

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## Fukushima Fallout: 12 Months of Mishaps and Misery March 2013 - February 2014

*Compiled by Nuclear Monitor editor Jim Green, drawing in part from Nuclear Monitor articles ([www.wiseinternational.org/nuclear-monitors](http://www.wiseinternational.org/nuclear-monitors)) and from Greenpeace updates ([www.greenpeace.org/international/en/news/Blogs/nuclear-reaction](http://www.greenpeace.org/international/en/news/Blogs/nuclear-reaction)).*

*A referenced and more detailed version of this chronology is posted at: [www.wiseinternational.org/node/4051](http://www.wiseinternational.org/node/4051)*

*Greenpeace has compiled a chronology of Fukushima news from March 2011 to January 2014: <http://tinyurl.com/gp-chronology>*

### March 2013

Of the eight members of a post-Fukushima energy advisory policy board who supported a non-nuclear future, six are removed by Prime Minister Shinzo Abe, so 13 of the 15 members of the reconstituted board are pro-nuclear - some with conflicts of interest.

The World Health Organisation released a report on health risks from the Fukushima disaster. According to the WHO:



## Monitored this issue:

### Fukushima Fallout:

**12 Months of Mishaps and Misery  
March 2013 - February 2014**

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**Radiation Makes People Invisible - Robert Jacobs 12**

*In terms of specific cancers, for people in the most contaminated location, the estimated increased risks over what would normally be expected are:*

- *all solid cancers - around 4% in females exposed as infants;*
- *breast cancer - around 6% in females exposed as infants;*



Anti-nuclear protest in Tokyo.

- leukaemia - around 7% in males exposed as infants;
- thyroid cancer - up to 70% in females exposed as infants (the normally expected risk of thyroid cancer in females over lifetime is 0.75% and the additional lifetime risk assessed for females exposed as infants in the most affected location is 0.50%).

For people in the second most contaminated location of Fukushima Prefecture, the estimated risks are approximately one-half of those in the location with the highest doses. The report also references a section to the special case of the emergency workers inside the Fukushima NPP [Nuclear Power Plant]. Around two-thirds of emergency workers are estimated to have cancer risks in line with the general population, while one-third is estimated to have an increased risk.

Actions and vigils were held in an estimated 270 locations throughout Japan to mark the second anniversary of the Fukushima disaster. On March 10, an estimated 40,000 citizens demonstrated around Tokyo.

A power outage left 8,800 nuclear fuel assemblies, each holding 60 fuel rods, without fresh cooling water for 21-29 hours from March 18-20. A brief power outage shut down three switchboxes, and although power was quickly restored, the switchbox failure persisted, leading to failure of the cooling systems. TEPCO said a rat, found dead inside a switchbox that had been operating outdoors on a truck for more than two years, caused the problem. A TEPCO spokesperson said: "Fukushima Daiichi still runs on makeshift equipment". TEPCO

delayed notifying the Nuclear Regulation Authority and local municipal officials about the incident. "We sincerely apologise. We are deeply regretful over the delay in reporting the incident and for causing anxiety to residents," said a TEPCO spokesperson.

A worker said he was ordered in to the Fukushima plant to tackle the March 2011 meltdowns wearing insufficient protection gear and that two of his ill-equipped colleagues suffered beta-ray burns after they had to wade through radioactive water. The team leader told workers to ignore warnings from their radiation monitors, saying they must be broken.

Japan's health ministry revealed that at least 63 Fukushima Daiichi workers were exposed to radiation levels higher than those registered in their personal records between November 2011 and October 2012.

Three workers came forward to confirm illegal dumping of radioactive materials by subcontractors involved in the clean-up and decontamination operations in Fukushima Prefecture.

The *Asahi Shimbun* newspaper revealed that contractors accused of underpaying decontamination workers were tipped off before "surprise" visits by government investigators. Some contractors ordered workers to lie about receiving hazard pay.

A probe by the Health, Labor and Welfare Ministry found violations - such as inadequate education and protection from radiation exposure, a lack of medical checks and

unpaid salaries and hazard pay - at nearly half of the clean-up operations in Fukushima. About half of the 242 contractors were reprimanded for violations.

TEPCO reported that it has captured a greenling fish near the Fukushima plant containing 510,000 becquerels/kg of radioactive cesium - the highest level recorded in the utility's seafood sampling surveys since the March 2011 disaster.

Tests on food conducted between April 2012 and January 2013 found that approximately 2,000 samples of mushrooms, seafood, and wild game contained more than 100 becquerels/kg of radioactive cesium, the government's limit for human consumption.

### April 2013

TEPCO acknowledged at least five leaks and spills of contaminated water in April, including a spill of around 110,000 litres from a polyethylene-lined tank (TEPCO waited two days before informing the Nuclear Regulation Authority about this spill). Some of the leaks were continuing because TEPCO has been unable to locate their source. TEPCO President Naomi Hirose apologised for the fiasco.

TEPCO said that 14 workers dealing with radioactive water problems were working without dosimeters - adding to the long and shameful history of employees and contractors working without dosimeters, or with dosimeters covered up, since the March 2011 triple-disaster.

TEPCO discovered that at least three of seven underground storage pools were seeping thousands of litres of radioactive water into the soil. TEPCO president Naomi Hirose travelled to Fukushima to apologise for the leaks. He said TEPCO would stop using the underground pits, and would pump the water out into more above-ground tanks. "We're aware that this is a crisis that we must attend to with urgency," Hirose said.

TEPCO said power to critical cooling systems at reactor #3's spent fuel pool was lost for the second time in less than a month on April 5, after workers installing a net designed to keep rodents away from a switchbox accidentally touched cables, causing a short in the system.

TEPCO halted cooling of a spent fuel pool on April 22 to remove two dead rats, the third time cooling equipment went offline in five weeks. TEPCO said it halted cooling of the reactor #2 pool, which stores spent fuel rods, for a few hours to remove the rats and install a net to stop further such intrusions.

An exposé by the *Mainichi Daily News* detailed how decontamination workers were living in Spartan conditions and receiving very low pay, as multiple layers of contractors and subcontractors shave off percentages of their wages. A contracting firm representative said: "You can't really turn a profit unless you hit the workers' wages or shave them down somehow. In the end, the whole system is designed to make money for the big construction companies at the top."

TEPCO finally acknowledges that the company's failings were responsible for the Fukushima disaster. "Our



safety culture, skills, and ability were all insufficient. We must humbly accept our failure to prevent the accident, which we should have avoided by using our wisdom and human resources to be better prepared," said TEPCO President Naomi Hirose.

### May 2013

In November 2012, the UN Human Rights Council sent Special Rapporteur Anand Grover to Japan to assess the situation in the aftermath of the Fukushima disaster. Grover's report, released in May 2013, was highly critical of both TEPCO and the Japanese government. For example the report criticised TEPCO for its "attempts to reduce compensation levels and delay settlement" through a complicated and difficult compensation process, and TEPCO's failure to protect workers from radiation exposure.

An exposé by the *Asahi Shimbun* newspaper revealed that the Japanese government avoided setting stringent radiation reference levels for the return of Fukushima evacuees for fear of triggering a population drain and being hit by ballooning costs for compensation.

Local authorities shut down two parking lots in Fukushima City for decontamination after the discovery of radioactive hotspots (up to 430,000 becquerels/kg) by the non-profit Citizen's Radioactivity Measuring Station. The surveys were carried out from April 29 to May 2 at the behest of local residents.

The United Nations Scientific Committee on the Effect of Atomic Radiation (UNSCEAR) trivialises the long-term cancer death toll from the Fukushima nuclear disaster, stating: "It is unlikely to be able to attribute any health effects in the future among the general public and the vast majority of workers." UNSCEAR's propaganda is challenged by radiation experts such as Dr Ian Fairlie. There may be internal dissent within UNSCEAR. In October 2013, 65 Japanese non-government organisations issued a statement calling on UNSCEAR to revise its report and its findings. Early estimates of the long-term cancer death toll from Fukushima radiation exposure range from 130 to 3,000.

### June 2013

Despite public promises by Prime Minister Shinzo Abe to complete decontamination work in Fukushima Prefecture by March 2014, Japan's government

informed municipal officials that they will likely not meet their stated deadline. The decontamination schedule was already far behind schedule - clean-up efforts had not even begun in five of 11 municipalities that had been declared evacuation zones. The government also informed municipalities that it would not allow decontamination work to be redone in areas where radiation levels have not declined even after decontamination efforts had been completed.

TEPCO was again under fire for failure to pay adequate compensation to Fukushima prefectural and local governments that were forced to shoulder costs of damage, decontamination, evacuation, and other losses. As of April 30, those expenses totalled 46.7 billion yen (US\$461m, €335m), but TEPCO had only paid 5.2 billion yen. Local leaders threatened to sue, complaining that the utility has been unresponsive to their repeated requests for payment. "No matter what we say, we get no reply," said Takanori Seto, the mayor of Fukushima City. "We'll file a lawsuit."

Japan's Nuclear Damage Claim Dispute Resolution Centre ruled that TEPCO must pay a group of 180 residents from Iitate 500,000 yen (US\$4,900, €3,600) for emotional distress from high levels of radiation exposure. Pregnant women and children under 18 at the time of the accident were awarded one million yen each. People from that area were not told to evacuate until a month after the nuclear crisis first began.

In another case, TEPCO agreed to compensate to the family of a farmer from Sukagawa, who committed suicide after learning that he would be forced to stop selling cabbage from his organic farm. He had worked on the farm for 30 years. TEPCO agreed to pay over 10 million yen (US\$99,000, €72,000) after the Nuclear Damage Claim Dispute Resolution Centre intervened. Company officials continued to refuse to apologise to the man's family.

TEPCO said it had discovered high levels of radioactive strontium-90 (about 1,000 becquerels of strontium per litre) and tritium (500,000 becquerels per litre) in a well located 27 metres from the Pacific Ocean but waited for nearly a month before revealing the news to the public. Radioactive tritium found in samples of ocean water near intakes at Fukushima Daiichi were the highest ever recorded there – up to 1,100 becquerels/litre.

The Advanced Liquid Processing System, designed to remove radioactive contaminants from water at Fukushima, was found to be leaking, as was a desalination system used to remove salt from radioactive cooling water.

At its annual general meeting, TEPCO's shareholders voted down a Greenpeace resolution to hold GE, Hitachi and Toshiba – the suppliers of the Fukushima Daiichi nuclear reactors – financially accountable for the accident.

TEPCO's legal troubles continued to mount as yet another group filed suit against it. Family members of hospital patients and elderly nursing home residents who died in the process of evacuation, or because staff were unavailable to care for them, are suing the utility for



Water storage tanks at Fukushima.

approximately US\$300,000 (€220,000) each. More than 200 people were stuck in hospitals and nursing facilities following the nuclear accident, and 50 of those died. In late May, the Namie municipal government announced that it would sue TEPCO on behalf of over 11,000 residents for psychological suffering. TEPCO is already paying victims 1,000 yen per month, but Namie officials called for the amount to be increased to 3,500 yen. The Japanese government was considering suing TEPCO to recover money spent on decontamination operations.

### July 2013

In addition to problems with water tanks, there are ongoing problems with contaminated water in, around and beneath the reactor buildings. On July 10, the Nuclear Regulation Authority announced it "highly suspected" that the plant was leaking contaminated water into the ocean. TEPCO didn't acknowledge what was happening until July 22 – a month after initial suspicions were raised. The Nuclear Regulation Authority's Shunichi Tanaka said he believed contamination of the sea had been continuing since the March 2011 catastrophe.

The Advanced Liquid Processing System was out of operation again, after corrosion by contaminated water caused leaks in the system's tanks.

The International Atomic Energy Agency called the Fukushima plant a "blueprint" for terrorists. Matthew Bunn, a former White House adviser, said: "Fukushima sent a message to terrorists that if you manage to cause a nuclear power plant to melt down, that really causes major panic and disruption in society. All you need to do that is to cut off power for an extended period of time." Japanese nuclear utilities opportunistically use security concerns to restrict media access to nuclear plants. "In many cases," the *Asahi Shimbun* newspaper reports, "the restrictions to information disclosure go beyond what nuclear regulators have said should be kept under wraps."

Japan's Ministry of Health, Labour, and Welfare announced that the radiation exposure records of 452 Fukushima workers were inaccurate, and they were exposed to greater amounts of radiation than TEPCO reported.

## August 2013

A water storage tank leaked around 300 tons of radioactive water, some of which likely reached the ocean via a drainage ditch. The leak was rated Level 3 on the International Nuclear Events Scale by Japan's Nuclear Regulation Authority – making it the most serious incident since the March 2011 disaster. Level 3 can be assigned when there is “severe contamination in an area not expected by design, with a low probability of significant public exposure.”

Nuclear Regulation Authority commissioner Toyoshi Fuketa said TEPCO “has not left any record of inspections of the tanks. I have to call this sloppy.” At an August 21 media conference, TEPCO executive Zengo Aizawa apologised for the latest tank leak and said: “The problem of contaminated water is the largest crisis facing management and we will place priority on dealing with the issue.”

The 300-ton leak lifted the lid on scarcely-believable patterns of mismanagement by TEPCO:

- Between July 2012 and June 2013, the Nuclear Regulation Authority made recommendations or issued instructions around 10 times to increase patrols and to install more observation cameras and water gauges, among other measures. The recommendations were largely ignored.
- TEPCO initially assigned only two workers to inspect 1,000 water tanks, during twice-daily patrols of two hours each.
- Radiation levels were not measured unless a worker suspected something was wrong.
- The tanks were constructed by bolting together sheets of metal, rather than welding them. Welded tanks are more secure but TEPCO chose the bolted type because they are cheaper and faster to construct.
- The tanks were built in part by illegally hired workers. Workers were told to lie about being hired by third-party brokers.
- The life-span of the tanks is only around five years. A worker described corner-cutting measures to save time and money including the use of adhesive tape to cover openings on storage tanks; and the use of second-hand components: “I couldn't believe that such slipshod work was being done, even if it was part of stopgap measures.”

Economy, Trade and Industry Minister Toshimitsu Motegi said TEPCO “has been playing a game of Whac-a-Mole with problems at the site.”

On August 26, the Japanese government directed TEPCO to enhance management of the tanks and the surrounding area; reinforce patrols; accelerate replacement from bolted joint tanks to welded joint tanks; accelerate the highly-contaminated water treatment and decrease the radiation dose of the surrounding area by collecting the contaminated soil; and identify the risks of storing highly-contaminated water and take actions against the risks.

The Nuclear Regulation Authority's Shunichi Tanaka

said TEPCO's efforts to monitor oceanic radiation levels had been insufficient. A trial fish catch near the Fukushima plant was deferred in the wake of recent spills and leaks. Hiroshi Kishi, chair of the Japan Fisheries Co-operative, said: “This has dealt an immeasurable blow to the future of Japan's fishing industry, and we are extremely concerned.”

By May, TEPCO realised that contaminants apparently leaking from a maze of conduits near the reactors were responsible for a spike in radiation levels in groundwater elsewhere in the plant. TEPCO began to build an underground ‘wall’ created by injected hardening chemicals into the soil but the barrier created a dam and water pooled behind it eventually began to flow over. In August, government officials said they believed 300 tons of the contaminated water was entering the ocean daily. Yushi Yoneyama, an official with the Minister of Economy, Trade and Industry (METI), said: “We think that the volume of water (leaking into the Pacific) is about 300 tonnes a day.” Tatsuya Shinkawa, a director in METI's Nuclear Accident Response Office, said the government believed water had been leaking for two years, but Yoneyama told Reuters it was unclear how long the water had been leaking at the current rate. Shinkawa described the water as “highly” contaminated.

Shinji Kinjo, head of a Nuclear Regulatory Authority taskforce, described the situation as an “emergency” and said the contaminated water discharges exceeded legal limits of radioactivity.

Mayors from Futaba, Okuma, Tomioka, and Naraha joined Fukushima Governor Yuhei Sato in formally demanding the decommissioning of all 10 nuclear reactors in Fukushima Prefecture, not just those that were damaged in the 2011 nuclear disaster.

Ten out of 16 people who boarded an on-site bus at the Fukushima plant had bodily radioactive contamination, and a further two people on another on-site bus were confirmed to have bodily contamination. TEPCO said it thought the problem was due to dust drifting from debris removal operations in the reactor #3 building.

TEPCO donated tens of millions of yen to a pro-nuclear local government in August despite promising to abolish such payouts to accelerate compensation for victims of the Fukushima disaster. TEPCO and Tohoku Electric Power Co. paid a combined 200 million yen (US\$2m, €1.4m) to Rokkasho, Aomori Prefecture.

## September 2013

In early September, TEPCO said workers had discovered high levels of radioactivity on three water tanks and one pipe. One reading was equivalent to 1,800 millisieverts per hour at a distance of 5 cm (compared to typical background radiation levels of 2–3 millisieverts per year) and another reading was 2,200 millisieverts per hour. At least five of the tanks holding contaminated water were believed to have leaked.

The Japanese government announced on September 3 the various measures it would pursue to deal with ongoing water management problems, such as: establish an inter-minister level council; establish an inter-governmental liaison office near TEPCO's

Fukushima site; establish an inter-governmental council for coordination near the Fukushima site; provide US\$470 million (€340m) in financial support (to install a frozen soil wall and to provide multi-nuclide removal equipment); and enhance monitoring and risk management efforts.

As of the end of August 2013, Japan had collected a total of 37,470 fish samples—14,070 of which were from Fukushima Prefecture. The tests concluded that 92.6% of the samples from Fukushima were below the limit of 100 becquerels/kg. From outside the prefecture, 98% of the tests were below the standard.

At least 33 anti-nuclear citizens groups around Japan were targeted in a campaign of cyber-attacks beginning mid-September. They were on the receiving end of a blizzard of 'denial of service' email attacks. Experts said there was little doubt that a computer program developed exclusively for the purpose was used. The groups targeted include the Women's Active Museum on War and Peace and the Metropolitan Coalition Against Nukes.

Japan's Prime Minister Shinzo Abe assured the International Olympic Committee on September 7 that the Fukushima situation – in particular the leakage of contaminated water from holding tanks and the constant flow of contaminated groundwater – was "under control". But a national survey by the *Asahi Shimbun* newspaper found that only 11% of Japanese agreed with Abe's assertions.

A senior TEPCO official acknowledged the water leaks were not under control. Shunichi Tanaka, chair of the Nuclear Regulation Authority, said that TEPCO "has not been properly disclosing the situation about the contamination and the levels of contamination." The town assembly of Namie, Fukushima Prefecture, unanimously passed a resolution on September 20 stating that there is a "serious problem" with Abe's remarks as they "contradict reality." The resolution states: "The situation has never been 'under control,' nor is the contaminated water 'completely blocked.'" Toshimitsu Konno, a fisherman in Fukushima Prefecture, responded to the Prime Minister's comments to the IOC meeting: "He must be kidding. We have been tormented by radioactive water precisely because the nuclear plant has not been brought under control."

As the string of scandals surrounding contaminated water unfolded, South Korea greatly expanded bans on fish imports on September 6. A ban on fish imports from Fukushima Prefecture was extended to a further seven prefectures. South Korean fisheries vice-minister Son Jae-hak said that Japanese authorities had failed to provide timely and detailed information about the water leaks and that the ban would stay in place indefinitely.

The Nuclear Regulation Authority (NRA) came under criticism on September 30 from a group of intellectuals studying the Fukushima crisis and participating in a review of the NRA's first year of operation. Lawyer Shuya Nomura criticised the NRA for its handling of the radioactive water leaks, while others pressed for reforms of the NRA's Secretariat, which is staffed mostly by personnel from the previous, discredited regulator. NRA chair Shunichi Tanaka said he feels the Authority has

been given a mandate bigger than its capacity, but that members will try to improve.

The Advanced Liquid Processing System was shut down yet again, after being in operation again for under 24 hours.

Survivors expressed disappointment and anger at the September 9 announcement by the Tokyo District Public Prosecutors Office that it will not seek to indict government or TEPCO officials connected with the Fukushima disaster. Hiroyuki Kawai, lead lawyer for a group of about 15,000 disaster victims and others, said: "How can they say they conducted a thorough investigation when they did not carry out any raids on relevant offices? From the very beginning, it was not an investigation seeking indictments, but rather, one conducted so no indictments would be handed down." The group alleged negligence resulting in death and injury and other charges against 42 officials.

A total of 171 people from Fukushima Prefecture who had to flee their homes because of the Fukushima disaster commenced legal action against TEPCO and the Japanese government. The plaintiffs, from 60 families now living in western Japan, filed two suits, one with the Osaka District Court and the other with the Kyoto District Court. Similar damages suits have been filed with 11 district courts by 3,811 plaintiffs, according to lawyers of the western Japan groups. Plaintiffs argue that TEPCO neglected its duty to prepare the plant for earthquakes and tsunami, while the central government failed to take stringent regulatory steps to prevent the triple meltdown.

Decontamination efforts are on schedule in only four out of 11 municipalities. "I have run out of patience," farmer Muneo Kanno told the *Asahi Shimbun* newspaper. "We villagers are brimming with distrust of the central government and are concerned about whether we can eventually return. We are left deprived of our lives, and our return has been kept on hold."

### October 2013

A 16-member International Atomic Energy Agency (IAEA) mission lavished praise on Fukushima clean-up operations but called on Japanese authorities to work harder to convince Japanese citizens to accept higher radiation doses. The IAEA was peddling similar lies in July 2011, when IAEA Director-General Yukiya Amano said clean-up work was "moving very smoothly".

On October 1, when transferring contaminated rainwater, a leak of about 5,000 litres occurred.

On October 2, about 17,000 litres of contaminated rainwater leaked into an area behind a dike. About 430 litres – with tritium contamination of 580,000 becquerels/litre – leaked into a drainage system and possibly from the drainage system into the ocean. A TEPCO official said: "We are sorry for causing anxiety."

On October 4, TEPCO announced yet another problem with the Advanced Liquid Processing System (ALPS) resulting in its temporary shut-down. The stoppage came just four days after TEPCO got the system up and running after a breakdown.



On October 4, Nuclear Regulation Authority secretary general Katsuhiko Ikeda berated TEPCO over “the inappropriate management of contaminated water”, saying the “problems have been caused by a lack of basic checks.” He added: “I can’t help but say that standards of on-site management are extremely low at Fukushima Daiichi. ... The failure to make rudimentary checks reflects a clear deterioration in the ability to manage the site.” Ikeda said the problems at Fukushima raised serious questions about TEPCO’s ability to operate its other nuclear plants, like the huge Kashiwazaki-Kariwa plant that TEPCO wants to restart.

Niigata Prefecture Governor Hirohiko Izumida – who effectively holds a veto over TEPCO’s plan to restart reactors at the Kashiwazaki Kariwa plant – said TEPCO must give a fuller account of the Fukushima disaster and address its “institutionalized lying” before it can expect to restart reactors. Izumida cited TEPCO’s belated admission in July – following months of denials – that the Fukushima plant was leaking radioactive substances into the ocean as evidence that TEPCO has not changed. “If they don’t do what needs to be done, if they keep skimping on costs and manipulating information, they can never be trusted,” he said. He added: “There are three things required of a company that runs nuclear power plants: don’t lie, keep your promises and fulfil your social responsibility.”

The Nuclear Regulation Authority said on October 7 that a Fukushima worker conducting system inspections mistakenly pushed a button turning off power to some

of the systems in the four reactor buildings at the Fukushima plant, but a backup system kicked in.

A citizens’ watch group reports numerous radioactive hot spots at future venues for the 2020 Summer Olympic Games, all located in and near Tokyo.

On October 9, TEPCO announced that about 7,000 litres of water leaked from a pipe joint in the desalination system and flowed into a ditch. TEPCO said the leak was caused by human error – workers mistakenly removed the wrong pipe from of the desalination system. Out of 11 workers who were working around the desalination system, six had radioactive materials on their bodies.

On October 10, TEPCO announced that it had detected cesium-137 in seawater one kilometre from the Fukushima Daiichi plant, and that it had discovered a significant increase in cesium-134 and cesium-137 in the water-intake area at unit 2 – measured levels were well in excess of regulatory limits for waste water and were at a two-year high. TEPCO said cesium readings on October 9 jumped 13 times the previous day’s reading, and that the spike was caused by construction work near the reactor #2 building.

On October 13, an estimated 40,000 people rallied against nuclear power in Tokyo.

On October 14, the *Mainichi Shimbun* newspaper reported that about 40% of Japanese nuclear plant equipment exported over the past decade failed to go through national government safety inspections.



Fukushima anniversary commemoration and protest, Melbourne, Australia, March 2012.

On October 17, water overflowed out of a temporary tank which stored contaminated groundwater.

After heavy rain on October 20, contaminated water overflowed containment areas built around the 1,000 tanks.

On October 23, a water sample collected about 600 metres from the outer sea, showed that the total beta-radioactivity was at its highest concentration level yet: 140,000 becquerels/litre, compared with 59,000 becquerels/litre at the same place on October 22. TEPCO suggested the reading was due to heavy rains over the previous week.

Japanese authorities may have underestimated by 20% the radiation doses workers got in the initial phase of the Fukushima nuclear power plant disaster. The U.N. Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) raised doubts about the dose estimates of the government and TEPCO.

Media reports in October detailed the difficult and sometimes dangerous situation faced by decontamination and decommissioning workers within and beyond the Fukushima Daiichi plant. Problems include:

- The vast number of workers required – an estimated 50,000 workers have been involved in decontamination work since March 2011 and by October it had

become increasingly difficult to fill job openings for decontamination work. Subcontractors have turned to cheap labour from itinerant workers known as ‘nuclear gypsies’.

- The situation has been exploited by *yakuza* – organised crime syndicates – which have run labour rackets for generations. Nearly 50 gangs, with 1,050 members, operate in Fukushima Prefecture.
- Failure to properly monitor the activities of many hundreds of companies subcontracted to carry out decontamination work.
- Nearly 70% of the clean-up companies surveyed in the first half of 2013 had broken labour regulations, according to a labour ministry report in July. The ministry’s Fukushima office received 567 complaints related to working conditions in the decontamination zone in the 12 months year to March 2013; the ministry issued 10 warnings, but no firm was penalised.
- Many decontamination workers earn poor money and live in poor conditions. Former decontamination worker Watanabe Kai said: “Every penny the company spends in Fukushima is a loss. So the mentality is to save as much as possible, not to ensure good conditions and safety for workers.”

By the end of October, only 28.5% of houses, 33.2% of roads and 12.3% of forests around the Fukushima



plant had been cleaned, according to the Fukushima Department of Environment. The Japanese government has extended the time-frame for the clean-up of the exclusion zone around the plant, initially due to be completed by March 2014, until 2017. Officials cited several difficulties as reasons for pushing back the timetable, including finding space to store contaminated waste.

Claims by TEPCO and the government that radioactive water leaking into the sea from the Fukushima plant is confined to an area of 0.3 square kilometres are disputed by a US scientist. "These statements like a 0.3 square-kilometre zone are silly," Woods Hole Oceanographic Institution senior scientist Ken Buesseler said. "It's not true to the science. ... There's a lack of trust that they keep reinforcing by saying things like 'beyond this 0.3 kilometres zone there's no release.'"

### November 2013

On November 10, water with a record high level of 710,000 becquerels/litre of beta-ray sources, such as radioactive strontium, was detected in an observation well 10 metres north of the tank that leaked 300 tons of highly contaminated water in August. TEPCO detected 400,000 becquerels/litre at the same well on October 17.

Surveys published in the *Asahi* and *Mainichi* newspapers on November 12 found 60% and 54% of respondents respectively agreed that Japan should aim to go nuclear-free.

TEPCO said on November 28 that a shortage of water storage tanks has forced it to postpone removal of radioactive groundwater at Fukushima Daiichi. The postponement would allow radioactive groundwater to continue to flow beyond soil hardened with chemicals between reactors #2 and #3 and into the sea.

The lower house of Japan's Parliament approved a state secrecy bill on November 27 that imposes stiff penalties on bureaucrats who leak secrets and journalists who seek them. The bill was approved after hours of delay due to protests by opposition lawmakers. The bill allows heads of ministries and agencies to classify 23 vaguely worded types of information related to defense, diplomacy, counterintelligence and counterterrorism. Critics say it might sway authorities to withhold more information about nuclear power plants. Under the bill, leakers in the government face prison terms of up to 10 years, up from one year now. Journalists who obtain information "inappropriately" or "wrongfully" can get up to five years in prison.

Reporters Without Borders said: "How can the government respond to growing demands for transparency from a public outraged by the consequences of the Fukushima nuclear accident if it enacts a law that gives it a free hand to classify any information considered too sensitive as a state secret?" In early 2013, Japan fell from 22nd to 53rd place in the Reporters Without Borders' ranking of media freedom. This was attributed to a single factor – the lack of access to information related to the Fukushima nuclear disaster. Many reporters have met with restricted access, lack of transparency and even lawsuits while

TEPCO has consistently barred access to documents and to people.

The pro-nuclear policies of Liberal Democratic Party (LDP) Prime Minister Shinzo Abe have been criticised by four former Prime Ministers:

- Junichiro Koizumi (LDP) said in an October 1 speech to business executives: "There is nothing more costly than nuclear power. Japan should achieve zero nuclear plants and aim for a more sustainable society."
- In 2012, former Democratic Party of Japan (DPJ) Prime Minister Yukio Hatoyama joined an anti-nuclear protest outside the residence of then Prime Minister Yoshihiko Noda.
- Naoto Kan, the DPJ prime minister when the earthquake and tsunami hit in 2011, told an audience in New York on October 8 that he had been a supporter of nuclear power, but after the Fukushima accident, "I changed my thinking 180-degrees, completely."
- Morihiro Hosokawa, said in an interview published on November 12 that Abe's nuclear energy policy was a "crime" and that he was willing to campaign against it. "I foolishly once believed the myth that nuclear energy is clean and safe. That myth has completely broken down. We need to turn around by 180 degrees the current energy-guzzling society dependent on nuclear power," Hosokawa said.

For the first time, a leak from the containment vessel of one of the damaged reactors is confirmed – highly contaminated water is leaking from the containment vessel of reactor #1.

TEPCO announces it will permanently close the undamaged reactors #5 and #6 at the Fukushima Daiichi plant and convert them into research facilities to help plan for the removal of fuel from reactors #1, #2, #3 which suffered core meltdowns.

On November 26, an anti-nuclear citizens' group aiming to collect signatures from 10 million people handed the second round of collected signatures to the Parliament and the Cabinet Office. As of November 20, the group named "Sayonara Nuclear Power Plants" had collected a total of 8,378,701 signatures. During and after the submission of the signatures, group members held a meeting in the Diet building and a rally in Hibiya Park, and then set out on an anti-nuclear march in downtown Tokyo.

### December 2013

On December 1, one of the three Advanced Liquid Processing System units was shut down after found to be leaking hydrochloric acid. The unit had been in trial operation and was scheduled to go into full operation on December 1.

Many of those evacuated from towns close to Fukushima are still living in temporary accommodation. Occupancy rates of the temporary housing built in Iwate, Miyagi and Fukushima prefectures in the aftermath of the disaster are at 85%. "Family members live apart and it's no good. Since we can't go back to our hometown, this is like a living hell. Nothing will change even if we complain," said Yoichi Matsumoto, a resident in temporary

accommodation in Iwaki. "There is a strong likelihood that it may take five years or more after the quake to see all occupants move out," said an Iwate official.

TEPCO said on December 2 it had found radioactive contamination 36,000 times permissible levels in water taken from an observation well. The readings were taken from the well east of reactor #2 and 40 metres from the sea. The contamination measured 1.1 million becquerels/litre.

On December 6, TEPCO said it detected the highest estimated radiation level for an outdoor location at Fukushima. Readings equivalent to 15 sieverts and 25 sieverts per hour was taken on steel piping near an exhaust stack for the No. 1 and No. 2 reactors. A TEPCO official said radioactive materials derived from melted fuel likely entered the piping during venting soon after the accident occurred in March 2011 and have remained there.

TEPCO said radioactive water leaked at four places in barriers surrounding storage tanks between December 21 and 22. TEPCO gave figures of 800 litres and 1,000 litres.

On December 24, TEPCO reported that up to 225,000 litres of contaminated water leaked into soil from two storage tanks.

Unprotected contaminated waste left by clean-up operations is found in the open in Fukushima Prefecture. Radiation readings taken from the debris were as high as ten times the national limits, with bags of radioactive soil being stored in children's playgrounds at apartment complexes.

### January 2014

Naomi Hirose, president of TEPCO, acknowledged that TEPCO was incapable of adequately dealing with problems in 2013, and was continually responding late to issues as they arose. Hirose said that the utility will do its best "not to have any problems" in 2014.

More lies from the International Atomic Energy Agency (IAEA). The IAEA urges the Japanese government to "increase efforts to communicate that in remediation situations, any level of individual radiation dose in the range of 1 to 20 mSv per year is acceptable and in line with the international standards and with the recommendations from the relevant international organisations." The accepted limit for public exposure is 1 mSv annually from anthropogenic sources, not 1–20 mSv. The IAEA says it is ready to support Japan in the "challenging task" of peddling public health lies. Australian public health expert Assoc. Prof. Tilman Ruff gives some indication of the risks associated with the IAEA's propaganda: "To provide a perspective on these risks, for a child born in Fukushima in 2011 who was exposed to a total of 100 mSv of additional radiation in its first five years of life, a level tolerated by current Japanese policy, the additional lifetime risk of cancer would be on the order of one in thirty, probably with a similar additional risk of premature cardiovascular death."

Nearly three years after the Fukushima crisis began, reports to the Japan Teachers Union's national



convention show that children from the region continue to suffer emotional distress and are displaying "abnormal behaviour". Children evacuated elsewhere have been the victims of bullying. They have been told "Go home to the nuclear zone" and called "dappokusha" – a term usually given to defectors from North Korea. "People have dark feelings about the nuclear plant, and in that kind of atmosphere they tend to direct their anger at those who used to live near the plant. The children are being influenced by that," said one teacher. Another teacher said that children were adversely affected by living in temporary housing and going to class in space borrowed from other schools, such as gyms: "The stress has made it hard for some kids to relate to how other people feel. There are more and more children who can't seem to build human relationships. I'd say about half the kids in my class have issues that need to be dealt with as they grow up."

TEPCO acknowledged for the first time the probability that water was leaking from the reactor #3 containment vessel into the basement of the reactor building. A sample of the water showed extremely high contamination. The leakage is a significant finding – it could indicate that the #3 containment vessel has significant damage and cooling water is leaking from it.

TEPCO issued a new plan for victim compensation, recovery of Fukushima prefecture, and reorganisation of the company itself. It calls for an establishment of a new company exclusively dedicated to decommissioning of Fukushima.

The Japanese province of Fukushima has pledged to switch to 100% renewable energy by 2040. Energy will be generated through community energy initiatives and will provide a clean and self-sustaining source of heat and electricity throughout the area. A coalition of green energy groups welcomed the decision at a Community Power Conference held in Fukushima.

An investigation by the *Mainichi Shimbun* newspaper reveals that TEPCO has been demanding that

evacuated employees suspend their claims for compensation, and demanding that some evacuated employees refund compensation already paid. "If this life we're leading now isn't a refugee existence, then what is it?" said one employee.

The much-troubled Advanced Liquid Processing System (ALPS) stopped working yet again after a crane failure. TEPCO could not say when the system would be operational again. The ALPS has a long history of failures (see entries for June, July, September, October and December 2013).

A sit-in protest outside the head office of Kyushu Electric Power Co in Fukuoka marked its 1,000th day on January 14. The protest began in April 2011. "Humans cannot live side by side with nuclear energy. Never again should lives be threatened and livelihoods deprived," said protest organiser Yukinobu Aoyagi.

The Fisheries Research Agency said a black sea bream, caught 37 kms from the Fukushima plant, had 12,400 becquerels/kg of radioactive cesium, 124 times the safety standards for foodstuffs. The record cesium reading was recorded in 2013 when a fish caught near the plant registered 740,000 becquerels/kg of cesium.

More than 1,400 people have lodged a joint lawsuit against Toshiba, GE and Hitachi, the companies that supplied the three reactors that melted down at the Fukushima Daiichi plant. The lawsuit seeks to challenge the law that protects reactor manufacturers in the event of nuclear accidents, and will argue that the companies failed to make vital safety improvements at the plant before the crisis. The plaintiffs are not seeking punitive damages, merely a symbolic 100 yen each. They say the case is to help raise awareness of the issue. "It is a lawsuit designed to drag the makers of the reactors out of hiding," said attorney Hiroyuki Kawai.

Radiation measurements taken from an observation well at the Fukushima Daiichi nuclear power plant are increasing. Groundwater in the well measured 2.4 million becquerels/litre for strontium-90 and other beta-emitting particles.

## February 2014

According to information compiled by police and local governments, 1,656 people have died in the Fukushima prefecture as a result of stress and other illnesses caused by the 2011 disaster. This compares with 1,607 who were drowned by the tsunami or killed by the preceding earthquake. "The biggest problem is the fact that people have been living in temporary conditions for so long," said Hiroyuki Harada, a Fukushima official dealing with victim assistance, "People have gone through dramatic changes of their environment. As a result, people who would not have died are dying."

Former Prime Minister Morihiro Hosakawa ran as a candidate for the position of Tokyo governor but lost the February 9 poll after the LDP-backed candidate Yoichi Masuzoe blunted Hosakawa's anti-nuclear stance by pledging to reduce reliance on nuclear power and to expand renewable energy sources. "We have to break away from the system that depends on nuclear energy



in the long run, considering the dismal state (caused by the Fukushima crisis)," Masuzoe said.

Rifts are developing within Japan's nuclear village. The *New York Times* reported on February 11: "As a sign of the depth of the internal conflict, fissures have begun to appear even in Japan's once solidly pro-nuclear business world. While the powerful Keidanren lobbying group representing Japan's business establishment still remains a vocal supporter of restarting nuclear plants, many younger companies have turned against it. Rifts have also appeared within Mr. Abe's governing party, where a group of about 50 mostly younger lawmakers have staged a revolt against Mr. Abe's unabashedly pro-nuclear stance."

A group of around 50 LDP lawmakers has drawn up a proposal for the government to phase out nuclear power in Japan. "The plan should make clear that new commercial reactors should not be built ... and that reactors that have operated for 40 years should be scrapped," said the group.

TEPCO is re-analysing 164 water samples collected from April to September 2013 because previous readings "significantly undercounted" radiation levels. TEPCO said the problem was caused by errors in its testing of beta radiation. "These errors occurred during a time when the number of the samplings rapidly increased as the result of a series of events since last April, including groundwater reservoir leakage and a major leak from a storage tank," said a TEPCO statement. The Nuclear Regulation Authority said it relied on TEPCO's measurements.

TEPCO suspended the removal of spent nuclear fuel rods from the spent fuel pool at reactor #4 on February 25 after a cooling system failed due to a power cable damaged during excavation work at another building at the plant. Spent fuel removal resumed after four hours, once a backup system was activated.

TEPCO did not tell the public or the Nuclear Regulation Authority (NRA) until recently that extremely high levels of radiation were found in groundwater collected in an observation well last July, even though the utility was aware of the data that month. The groundwater sample contained five million becquerels/litre of strontium-90. TEPCO told the NRA that it had only recently compiled

the data, but later acknowledged that it had withheld the record readings. The *Asahi Shimbun* newspaper reported that TEPCO withheld 140 measurements of strontium found in groundwater and in the harbour between June and November 2013.

NRA chairman Shunichi Tanaka said that TEPCO still lacks a basic understanding of measuring and handling radiation.

On February 13, TEPCO said water samples from a new observation well contained the highest levels of radioactive cesium detected so far in groundwater at the site – 54,000 becquerels/litre of cesium-137 and 22,000 becquerels/litre of cesium-134.

On February 19, a storage tank overflowed, leading to a spill of about 100,000 litres of partially-treated radioactive water. TEPCO director and executive vice president Zengo Aizawa said: “We are deeply embarrassed that this sort of unacceptable event would occur after the many steps we have taken to improve the management of stored water.” More than nine hours before the leak was detected, an alarm warning of high water levels sounded but workers did not investigate, believing a malfunctioning water level gauge mistakenly set off the alarm. As of February 18, the volume of radioactive water stored in the 1,000 holding tanks at the plant had reached about 520,000 tons.

A joint survey by the Fukushima Prefecture government and the Tohoku Regional Agricultural Administration Office of the Ministry of Agriculture, Forestry and Fisheries found that the levels exceed 8,000 becquerels/kg of soil in 576 reservoirs. In 14 of those cases, the level exceeds 100,000 becquerels/kg and the highest reading was 390,000 becquerels/kg. The survey covered 1,939 reservoirs, or slightly more than half of the 3,730 in Fukushima Prefecture for agricultural use, and took place from February 2012 to December 2013. Officials said 108 of the 576 contaminated reservoirs are in zones where residents were evacuated due to the March 2011 nuclear disaster, while the remaining 468 reservoirs are located outside the evacuation order zones and still supply water to farmland. In some of the reservoirs where cesium measurements were high, officials noted that water levels were lower in summer and, as a result, the mud was exposed to the elements. In those instances, the exposed mud posed a health hazard to residents.

250,000 tons of contaminated soil have been bagged and stacked in 30 locations throughout Fukushima prefecture. Thousands of bags are in the middle of communities, waiting to be relocated. The blue ‘weatherproof’ bags are designed to hold the contents

safely for five years, but some of the soil was bagged in 2011 so the clock is ticking on bag integrity.

A mental health care centre reported a sharp increase in the number of people complaining about mental problems in the first half of fiscal 2013 among victims of the March 2011 triple-disaster. Stress that has built up in their minds may have reached a significant threshold in the third year after the disaster, experts warned.

Japan has received around 200 international suggestions on concepts to remove the remains of the Fukushima Daiichi reactor cores. The International Research Institute for Nuclear Decommissioning, which launched a request for information last year, will analyse and sort the submissions by the end of March 2014. TEPCO and the Japan Atomic Energy Agency estimate that all 77 tonnes of the fuel from reactor #1 melted and passed from the reactor vessel to the drywell area immediately below. At units 2 and 3, an estimated 30-40% of their 107-tonne cores remain in the vessels, the rest in the drywell.

Bypassing government guidelines, TEPCO said it will end compensation payments in February 2015 to people whose incomes have fallen because of the Fukushima disaster. But the Dispute Reconciliation Committee for Nuclear Damage Compensation, a governmental body that sets guidelines for compensation to nuclear disaster victims, has not decided when to terminate reparations. The guidelines state that “it will be reasonable to end compensation when residents become able to do business on a level equivalent to that before the disaster.”

On February 25, the Ministry of Economy, Trade and Industry released a draft energy plan proposing a mix of energy sources including ongoing reliance on nuclear power, which is described as an “important power source that supports the stability of the energy supply and demand structure”. However Prime Minister Shinzo Abe told Parliament: “We will work to promote an energy conservation society and introduce renewable energy ... On that basis, reliance on nuclear power will be cut as much as possible.” Likewise, industry minister Toshimitsu Motegi said the draft energy plan still committed the country to “reducing its reliance on nuclear power as much as possible”. The draft plan avoids quantifying the ultimate role of nuclear energy, with the “appropriate energy mix” to be determined at an unspecified later date.

Hundreds rallied in Tokyo on March 1 to protest Japanese prosecutors’ decision to drop charges over the Fukushima nuclear crisis, with no one yet punished nearly three years after the disaster.

# Radiation Makes People Invisible

**Author:** Robert Jacobs

*Robert Jacobs is an associate professor at the Hiroshima Peace Institute of Hiroshima City University in Japan. This article is condensed from a chapter from a book manuscript in preparation on the work of the Global Hibakusha Project by Robert Jacobs and Mick Broderick.*

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Radiation makes people invisible. We know that exposure to radiation can be deleterious to one's health; can cause sickness or even death when received in high doses. But it does more. People who have been exposed to radiation, or even those who suspect that they have been exposed to radiation that never experience radiation related illnesses may find that their lives are forever changed – that they have assumed a kind of second class citizenship.

As a historian of the social and cultural aspects of nuclear technologies I have spent years working in radiation-affected communities around the world. Many of these people have experienced exposure to radiation from nuclear weapon testing, from nuclear weapon production, from nuclear power plant accidents, from nuclear power production or storage, or, like the people in the community that I live, Hiroshima, from being subjected to direct nuclear attack. For the last five years I have been working with Dr. Mick Broderick of Murdoch University in Perth, Australia on the Global Hibakusha Project. We have been working in radiation-affected communities all around the world. In our research we have found a powerful continuity to the experience of radiation exposure across a broad range of cultures, geographies, and populations.

About half way between beginning this study and this present moment the nuclear disaster at Fukushima Daiichi happened here in Japan. One of the most distressing things (among so many) since this crisis began is to hear so many people, often people in positions of political power and influence say that the future for those affected by the nuclear disaster is uncertain. I wish that it were so, but there is actually a deep historical precedence that suggests that the future for the people of Tohoku is predictable.

In this short article I will outline some continuities to the experiences of radiation-affected people. Most of the following is also true for people who merely suspect that they have been exposed to radiation, even if they never suffer any health effects. Many have already become a part of the experiences of those affected by the Fukushima disaster. There are, of course, many differences and specificities to each community, but there is also much continuity.

**Sickness and mortality** – Sickness and even death are the results of exposure to radiation that people expect. It is important to know that there are many different ways that people can become ill after exposure to radiation. When people are exposed to high levels of gamma radiation they can suffer from acute radiation sickness and death can come in a matter of days, weeks or months. Tens of thousands of people died of acute radiation sickness in Hiroshima and Nagasaki after they survived the nuclear attacks.

For those who were not close to the detonation of a nuclear weapon, or within a short distance of a disaster like the Chernobyl or Fukushima disasters, illness is often the result of internalized alpha emitting particles. With nuclear detonations this comes down as "fallout." In the case of Chernobyl and Fukushima these came down over large areas as the plumes of the explosions there settled back to Earth.

**Losses of homes, community and identity** – Areas that experience radioactive contamination often have to be abandoned by those who live there. The levels of radiation may be high enough that continued habitation can be dangerous to health. In these cases people lose their homes; often traditional homes that may have been the primary residences for a family for multiple generations. In these cases one's identity may be deeply connected to the home and the land around the home.

For communities that have to be abandoned the bonds that have been built up and that sustain the wellbeing of the community are disintegrated. Friends are separated, extended families are often separated, and schools are closed. People who have lived in the same place all of their lives have to make a fresh start, sometimes in old age, sometimes as children, and lose the communal structures that have supported them: shopkeepers who know them, neighbors who can be relied on, the simple familiarity that we have by being known and knowing our way around.

**Loss of traditional knowledge** – In some remote places survival is dependent on centuries old understandings of the land. In Australia the areas where the British conducted nuclear testing in the outback are

very difficult places to live. Traditional communities in these areas often have songs that hold and transmit essential knowledge about how to survive in such a harsh environment, such as – where to find water, when to hunt specific animals, when to move to various areas.

When the British relocated them to live in areas hundreds of kilometers from their traditional homes this knowledge became broken. It became impossible for the refugee population to survive living a traditional life in areas where they had no knowledge of the rhythms of the land and animals. This removal from their traditional lands led quickly to dependence on governmental assistance and severed what had been millennium of self-reliance. This led to the further erosion of community, familial and personal wellbeing.

**Discrimination** – People who may have been exposed to radiation usually experience discrimination in their new homes and often become social pariahs. We first saw this dynamic with the hibakusha in Hiroshima and Nagasaki who found it very difficult to find marriage partners since prospective spouses feared they would have malformed children, found it difficult to find jobs since employers assumed that they would be sick more often, and often become the targets of bullying. It became very common to hide the fact that one's family had been among those exposed to radiation.

Children whose families evacuated from Fukushima prefecture after the triple meltdowns at Fukushima found themselves the victims of bullying at their new schools. Cars with Fukushima license plates were scratched when parked in other prefectures. Often this is the result of the natural fear of contamination that is associated with people exposed to a poison. In the Marshall Islands those who were evacuated from Rongelap and other atolls that became unlivable after being blanketed with radioactive fallout from the Bravo test in 1954 have had to live as refugees on other peoples atolls for several generations now. The Marshall Islands have a very small amount of livable land and so being moved to atolls that traditionally belonged to others left them with no access to good soil and good locations for fishing and storing boats. They have had to live by the good graces of their new hosts, and endure being seen as interlopers.

**Becoming medical subjects** – Many people who have been exposed to radiation then become the subjects of medical studies, often with no information about the medical tests to which they are subjected. Hibakusha of the nuclear attacks on Hiroshima and Nagasaki became medical subjects of the Atomic Bomb Casualty Commission during the American occupation of Japan

after World War Two. This study has continued to this day under the now jointly US-Japan operated Radiation Effects Research Foundation. In the early days of the study Japanese hibakusha had no choice about being subjected to the medical exams. An American military jeep would appear in front of their homes and they had to go in for an examination, whether it was a good time or not. They were not given information about the results of their tests. This has happened in many radiation-affected communities.

Many Pacific islanders exposed to radiation by the nuclear tests of the US, the UK and France had such experiences where they were examined and then sent off with no access to the results. Many report feeling as if the data had been harvested from them.

**Anxiety** – Often the first thing that those exposed to radiation are told is that they have nothing to worry about. Their anxieties are belittled. Radiation is a very abstract and difficult thing to understand. It is imperceptible – tasteless, odorless, invisible – adding to uncertainty that people feel about whether they were exposed, how much they were exposed to, and whether they and their loved ones will suffer any health effects. The dismissal of their anxieties by medical and governmental authorities only compounds their anxiety. When other members of their community develop health problems, such as thyroid cancer and other illnesses years later it can cast a pall over their own sense of wellbeing for the rest of their lives. Every time that they run a fever, every time that they experience pain in their stomachs, nosebleeds, and other common ailments this anxiety rears up and they think – this is it, it's finally got me. These fears extend to their parents, their children and other loved ones. Every fever that their child runs triggers horrible fears that their child will die.

**Radiophobia and blaming the victim** – Since it is often the case that who is and isn't exposed to radiation, especially to internalized alpha emitting particles, is unknown, large numbers of people near a nuclear detonation, a nuclear production plant, a nuclear power plant accident, a uranium mining location and countless other sources of exposure to radiation worry about their health and the health of their loved ones. Among this group, some have been exposed and some have not. The uncertainty is part of the trauma. Often, as is currently the case for the people of Northern Japan, all of these people are dismissed as having undue fear of radiation, and are often told that their health problems are the result of their own anxieties. In some cases that may well be true but it is beside the point.

For those who have experienced some radiological catastrophe, who may have been removed from their homes and communities and lost those bonds and support systems, who are uncertain as to whether each flu or stomach ache is the harbinger of the end, and who cannot be certain that contamination from hard to find alpha emitting particles is still possible when their children play in the park, anxiety is the natural response. Even if it does cause health problems, it is not their fault: forces outside of their control have upended their lives and they now must live a life of uncertainty and often experience discrimination. Of course they are going to suffer from the anxiety that this situation produces. To blame them for this is to blame the victims in the situation and is a further form of traumatization.

**Conclusions** – Radiation makes people invisible. It makes them second class citizens who no longer have the expectation of being treated with dignity by their government, by those overseeing nuclear facilities near to them, by the military and nuclear industry engaged in practices that expose people to radiation, and often by their new neighbors when they become refugees. People exposed to radiation often lose their homes, either through forced removal or through contamination that makes living in them dangerous. They lose their livelihoods, their diets, their communities, and their

traditions. They can lose the knowledge base that connects them to their land and insures their wellbeing.

Radiation can cause health problems and death, and even when it doesn't it can cause devastating anxiety and uncertainty that can become crippling. Often those exposed to radiation are blamed for all of the problems that follow their exposures. After a nuclear disaster we count the victims in terms of those who died but they are only a small fraction of the people who are truly victimized by the event. Countless more suffer the destruction of their communities, their families, and their wellbeing. The devastation that a nuclear disaster truly wreaks is unknowable.

The lives of those exposed to radiation, or those in areas affected by radiation but uncertain about their exposures, will never be the same. As Natalia Manzurova, one of the "liquidators" at Chernobyl said in an interview published two months after the Fukushima triple meltdowns: "Their lives will be divided into two parts: before and after Fukushima. They'll worry about their health and their children's health. The government will probably say there was not that much radiation and that it didn't harm them. And the government will probably not compensate them for all that they've lost. What they lost can't be calculated."

## WISE/NIRS Nuclear Monitor

The World Information Service on Energy (WISE) was founded in 1978 and is based in Amsterdam, the Netherlands.

The Nuclear Information & Resource Service (NIRS) was set up in the same year and is based in Washington D.C., US.

WISE and NIRS joined forces in the year 2000, creating a worldwide network of information and resource centers for citizens and environmental organizations concerned about nuclear power, radioactive waste, proliferation, uranium, and sustainable energy issues.

The WISE / NIRS Nuclear Monitor publishes information in English 20 times a year. The magazine can be obtained both on paper and as an email (pdf format) version. Old issues are (after 2 months) available through the WISE homepage: [www.wiseinternational.org](http://www.wiseinternational.org)

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